SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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TRY THIS ON YOUR AUTO!

Mobile Laboratory Helps Save Silkworms

(*See page 173*)

Vol. XVI *No. 441*

Do These Things Annoy You?

Psychology

Annoyances, pet aversions and irritations of everyday life, thousands of them, have received serious and careful study from Prof. Hulsey Cason of the University of Rochester during the past four years. As a result he was able to announce to the International Congress of Psychology that the following experiences are among those that cause the greatest irritation to most people:

The odor of dirty feet
To see or hear an animal being cruelly treated by a person
To see or hear a child being harshly treated by an older person
A dirty bed
Bad breath
To see a person at the table spitting out food
A dirty bath tub
Flies
To see an intoxicated woman
Body odor
To hear a person talking during a musical number
To hear a mosquito nearby when going to sleep
A young person's disrespect for a much older person
To see a person's nose running
To find a hair in food one is eating

Women are more annoyed than men as a general condition although some situations peeved men more than women and some individual women were oblivious to some things that greatly irritated most men. To dance with a fat person was more annoying to men than to women as was seeing a grown person crying. Men were also more annoyed by being solicited by a beggar in public. Sex is often unpleasant to women while it is usually rated as pleasant by men. One promising observation made by Prof. Cason is the fact that the more educated a person the less he is annoyed.

Nearly two thousand persons aided Prof. Cason in his tests by telling about their annoyances. Out of 21,000 pet aversions, 507 were selected as not too obvious and worthy of more study. Easily understandable annoyances such as due to breaking something or illness were not investigated. In addition to asking all sorts of persons to record their feelings toward the many annoyances, Prof. Cason asked them to explain them. As a result he found that things are irritating because they involve one or more of these qualities: Unpleasant association, interference with pleasant activity, opposing ego tendency or self importance, identification, regression or tendency to return to childlike behavior, undue familiarity, discards from the body, inherited tendencies and customs, conventions and taboos. Some things like harsh grating sounds and strong odors are probably inherited and common to all people and races but most troublesome things are such because we acquire unfavorable reactions to them during our lifetime, Prof. Cason believes.

A person with a gushing manner, the person who crowds into line in front of you, a person habitually arguing, a salesman trying to force you to buy something, hearing a person singing poorly, to have a person look over your shoulder at what you are writing, cockroaches, mice, odor of garbage, odor of liquor on a person's breath, also ranked high on the annoyance list.

Jazz music irritated some but is among the world's insignificant irritations. The sight of a snake is not so bad as being bothered by flies and hearing a woman swear is much worse than listening to a profane man. Bald heads of men annoyed some but not many. Sex, sin, dirt and germs frequently caused annoyances when they entered into situations.

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In This Issue—

Thyroid Grows Larvae

Entomology

The secretions of the ductless glands to which scientists are attributing increasingly important functions in the human body, are now believed to have a universal effect on living organisms generally. At least this is the conclusion reached by Dr. W. W. Alpatov, a Russian scientist working at the Institute for Biological research of the Johns Hopkins University.

The larvae of the banana fly, humble tool of many a significant contribution to biological knowledge, were divided into two groups of which one was fed on yeast and animal extract of thyroid while the other received yeast and powdered meat. They were allowed to feed sixty-seven hours when they were killed and measured.

"The exact proof of the specific effect of the hormone of vertebrates upon the invertebrates deprived of corresponding glands of internal secretion has a double significance," declared Dr. Alpatov in a report of his work to the National Academy of Sciences. "First, it shows that the substances produced by the glands of internal secretion have a universal effect on living organisms; second, that the invertebrates having a short period of development can be successfully used as very convenient test animals in the field of endocrinological researches."

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Hydrogen Shown to Have Twin

Chemistry

The whirling heart of an atom was displayed to the members of the American Chemical Society by a youthful German physicist, Dr. K. F. Bonhoeffer. The revelation of the state of affairs in the inmost core of the microcosm of matter was more than a stunt of delicately manipulated physical apparatus, too: it was a revolutionary demonstration that the hydrogen atom, the basic unit with which chemists reckon as mathematicians begin with the figure 1, is not one, but two. There are two kinds of hydrogen. The second kind, whose existence was unsuspected until Dr. Bonhoeffer proved it, is called para-hydrogen.

There is not much difference between the two types of hydrogen atom. They are both built up of the same thing: one electron, or particle of negative electricity, revolving around a central particle or nucleus as the moon goes round the earth. The hitherto unsuspected secret lies in the nucleus. The hydrogen nucleus is made up of two parts, which are in constant rotation. In the atom of ordinary, "plain" hydrogen these two parts spin in the same direction, just as the two ends of a doorknob turn in the same direction. But in para-hydrogen they spin in opposite directions, like the front wheels of a wagon slewed around on a sharp turn.

There is no immediate commercial importance to Dr. Bonhoeffer's discovery. It is absolutely "pure science." But when it is remembered that we now float dirigibles bigger than battleships with helium, which fifty years ago was "pure science"—and 90 million miles away on the sun at that—it is rash to predict what its significance may or may not be.

The contributions of chemists to the growth of American industry were not forgotten in the excitement over the discovery that we have been starting our chemical reckoning with a 2 instead of a 1. Much money can be saved, and gases valuable for heating houses or use in chemical industries can be obtained, by salvaging by-products now allowed to go to waste in "cracking" petroleum to make gasoline, according to Gustav Egloff, Chicago oil chemist. These gases could be used for enriching the water-gas now almost universally the basis of domestic fuel.

Iodine, which has figured largely in public discussion because of its importance in the prevention of goiter, is a gift of the rocks and not of the air, as has often been supposed. The idea that it floats inland from the sea as a gas in the atmosphere was dispelled by Prof. J. F. McClendon of the Unviersity of Minnesota. Careful analysis of air fails to show a trace of the gas. Iodine is carried by the air, it is true, but only locked up in dust particles; and dust is minutely fragmented rock. Rocks put iodine into the soil, plants take it up from the soil, and man and the animals get their iodine from the plants. Much iodine is carried to the sea in run-off water, and this iodine is lost to human use, except for such small fractions as are recovered in sea foods.

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Cornstalks to Furnish Light and Power

Chemistry

Gas for heating, lighting and power, carbon dioxide to put the "fizz" in soda-water and pop, and fibrous pulp for high-grade paper, will all come out of the same tankful of cornstalks when the process described before the meeting of the American Chemical Society by Prof. C. M. Buswell of the University of Illinois is worked out on a commercial basis.

A circle of cornfields within an eight-mile radius will yield enough stalks to keep a city of 80,000 supplied with gas, Prof. Buswell estimated. An individual plant small enough for the needs of the separate farmstead can be run by the farmer; or a huge plant of city size can be developed.

The process depends upon bacteria —germs of fermentation and decay, here recruited to the assistance of man rather than to his annoyance and damage. Turned loose in a tight tank with a lot of chopped-up cornstalks in water, plus some form of nitrogenous fertilizer, the bacteria convert a large part of the stalk material into methane and carbon dioxide. Methane is the same gas as the "fire-damp" that miners dread, but properly piped it becomes a tame and tractable heat and light producer.

The carbon dioxide has no value as fuel, but can be compressed into cylinders for soda-fountain use or frozen into "dry ice" for refrigeration. The left-over pulp in the fermentation tank is made up largely of the longer, tougher fibers of the stalk, the most valuable part from the point of the paper maker. Finally, Prof. Buswell pointed out, making cornstalks commercially valuable will result in the destruction of the European corn borer, which hides over winter in cornstalks and field stubble.

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Golf Ball Murders Fish

Ichthyology

Golf is charged with the murder of 74,000 fish at Glacier National Park fish hatchery. A player sliced badly, the ball entered and clogged the intake water line, and the thousands of little fish had nothing to swim in.

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Kansan Makes Diamonds

Chemistry

Artificial diamonds were promised the world by Prof. J. Willard Hershey of McPherson College, Kansas, who spoke before the American Chemical Society.

The most promising modern attempts at achieving this much-sought-for end, Prof. Hershey said, were made about thirty years ago by a French scientist named Moissan. Taking up the work where Moissan left off, the Kansas chemist has made some improvements in his technique and is hopeful of eventually producing good diamonds in the laboratory. His process consists of melting pure carbon with filings of various metals in an electric furnace, and then plunging the white-hot mass into an ice-cold saturated salt solution. The cooled mass is subjected to further chemical treatment, and then tested for diamond particles.

"I have not yet succeeded in all that I hope to accomplish," said Prof. Hershey, "but the largest diamonds produced at McPherson College are the largest genuine synthetic diamonds on record."

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Greenest Plants Grow Most Efficiently

Plant Physiology

Plants whose leaves contain the most chlorophyll, the stuff that makes leaves green, are the most efficient at the business of making new plant tissues—which is, from the farmer's point of view, the chief end and object of plant existence.

Ever since pioneer plant physiologists found out what chlorophyll is, and learned that its function is to capture carbon dioxide out of the air and with the help of sunlight to combine it with water to make sugar, it has been taken for granted that the more chlorophyll a plant has per square inch of leaf surface the faster it can make new stems and leaves.

It has remained for Dr. H. B. Sprague and Dr. J. W. Shive of the New Jersey Agricultural Experiment Station to determine the relation accurately, using the exact analytical methods of the chemical laboratory. They have recently reported their results in detail to the American Society of Plant Physiologists.

They grew standardized breeds of corn under carefully controlled conditions. They supplied nutrient chemicals at a known rate. They measured the areas of leaves, extracted the chlorophyll and determined its quantity per square centimeter and weighed their plants as they harvested them.

Correlating their data, they found that the strains with the most chlorophyll per unit area had produced the most cornstalk in a given time. They also found that the plants which produced the greatest spread of leaves were most efficient at the business of growth. A yellow pigment, carotin, which is found in leaves, bore a similar relation to the rate of new stalk and leaf production as did the chlorophyll.

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Alcohol for Autos

Chemistry

Absolute alcohol, made cheaply by a commercial-scale process and mixed with gasoline, is the standard American motor fuel of the future. Prof. D. B. Keyes of the University of Illinois told how waterless alcohol has been made possible at low cost, and how it has been used satisfactorily as an automobile and airship fuel. Ordinary "pure alcohol" contains 95 per cent. alcohol and 5 per cent. water. The water prevents it from mixing successfully with gasoline. Until the process for cheaply dehydrating alcohol was invented, absolute alcohol was a costly chemical used sparingly in laboratories but never thought of for commercial use. The present low price of gasoline has prevented a large use of alcohol for the manufacture of high-grade anti-knock mixed fuel; but it is bound to come into its own in time.

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A Cobwebless Mind

General Science

JONATHAN NORTON LEONARD in *Loki: the life of Charles Proteus Steinmetz* (Doubleday Doran):

The Steinmetz household had a non-religious atmosphere most favorable to the growth of a scientific mind. Although the father was not actively hostile to religion, he didn't let it bother him, and he took care to shield his promising son from its influence. He realized that religious training is apt to form in the mind of a child the disastrous habit of believing without proof. Pale hands from the years of infancy throw large monkey wrenches into the fragile machinery of reason. Inbred superstition never plays fair. If it can't cause active trouble it makes itself felt through bad mental habits: a desire to believe because believing is comfortable; a tendency to be shocked by the strong naked truth. Before a man can become a real scientist and not a mere technician, he must sweep his mind clear of all such cobwebs. It takes a strong intelligence to carry out this mental housecleaning, and much valuable time is lost in the process. In Steinmetz's mind the cobwebs were never allowed to accumulate.

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Oyster shells dredged from San Francisco bay are being used in cement making.

Largest Aerial Camera

Aviation

The world's largest aerial camera, weighing 130 pounds, and measuring about half the height of an average man, has just been tested successfully by photograph experts of the Army Air Corps at Wright Field.

The camera was developed to take widespread ground areas from high altitudes, and is the result of five years of experimentation. The pictures taken are 9 by 18 inches and the roll of film carried is 9½ inches wide and 150 feet long.

The camera's most unique feature is that its operation is fully automatic, possessing an automatic registering device whereby the elevation of the plane, the time, date, and the number of the negative are noted on one corner of the film. The device is electrically heated so that it will function at the below-zero temperatures found at altitudes exceeding 40,000 feet.

A test plane with a Wasp 420 horsepower motor was especially devised for the giant camera. The ship has been carefully balanced with a minimum of vibration. It holds six passengers without the camera, but carries only two when the camera is in place.

Ordinarily the camera is suspended through a hole drilled through a section of the ship's bottom. While the picture is being taken the plane moves at a speed of about 85 miles an hour. The completion of an exposure, including the automatic setting and winding of the shutter, the rolling of the film and the "shooting" of the picture, takes only 15 seconds. During these operations the photographer has very little to do, since he has already set the automatically controlled mechanism to snap pictures at regular intervals varying from a few seconds to several minutes.

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Saving the French Silk Industry

Entomology

By Marjorie MacDill

Once again the silk growers of France have had to call in the aid of science to rescue an industry that, in these days of slender silhouettes and diaphanous garments, gives that country an important source of income.

Though attempts to produce silk commercially in the United States have resulted in a complete flop, the recent setback in French sericulture and the ensuing research has a closer bearing on home affairs than the price of silk stockings. The secret lies in an interesting point in insect epidemiology: the disease of the silkworms, responsible for all the havoc among the nurseries of the Midi, is very closely related to a malady that attacks in epidemic form three well-known members of the U. S. Bureau of Entomology's Rogues' gallery; namely, the army worm, the tent caterpillar and the gypsy moth.

Obviously here is a fine example of what is one man's meat is another man's poison, or, in this case, vice versa. What French scientists find out about this dreaded disease of the industrious little caterpillars of the mulberry tree is likely to come in handy during the next outbreak of the army worm or in standing off the inroads of the gypsy moth in New England woodlands. Using some other parasitic insect to attack a pest is old tactics, but the epidemiology of insect diseases as a factor of control in agricultural warfare against six-footed invaders is a possibility that is just beginning to be talked about. Consequently every piece of new information on the subject that is uncovered is eagerly awaited by entomological investigators.

The first time that silk culture in France stood in grave danger of extinction from one of these epidemics in miniature was in 1865. The consulting expert then most eligible to draft by the minister of agriculture to salvage the source of crepe de chine and Lyons velvet was no less person than Louis Pasteur, the father of modern bacteriology. At that time Pasteur, who had started out in life as a chemist, had never seen a silkworm. T. J. H. Fabre, one of the great figures of entomology, whose wasps and beetles will live as long as French is read or translated, was given the task of instructing so famous a pupil.

Long years after Fabre related the story of the experience in a tone not entirely devoid of sarcasm. "He knew nothing," declared the eminent savant, "of the metamorphosis of insects; for the first time he had just seen a cocoon and learned that in this cocoon is a something, a sort of rough outline of what will one day become a butterfly; he was ignorant of what is well known to the most insignficant pupil in our southern schools and this novice, whose naive questions astonished me so much, was destined to revolutionize the hygiene of the silkworm nurseries even as he brought about a complete revolution in the practice of medicine and general hygiene."

LOUIS PASTEUR saved France's silk crop in '65. Now his modern successors have been called on to repeat the performance

In less than five years Pasteur succeeded in elucidating the problem of pébrine, the disease that had cut down production in some sections to one-half, and in putting into practice an effective and practical method of control. Silk culture was saved in a grave crisis that could have wiped out the industry in France. The selection of healthy stock following the principles laid down by him are still in use today and give excellent results.

Unfortunately, centuries of domestication and the necessity of raising caterpillars in nurseries in large numbers where epidemics spread rapidly from one individual to another, make the silkworm a ready prey to disease. Though, thanks to Pasteur, pébrine has almost disappeared, there are plenty of other maladies to take its place. The most troublesome of these are the diseases known as grasserie and flecherie. The ravages of these plagues in the regions of extensive culture, notably in the departments of Arceche and le Gard in the lower Rhone valley, finally came to such a pass about five years ago that a request was made to the minister of agriculture to appoint a scientist to study them and, if possible, find their causes and some means of prevention.

Dr. Andre Paillot, formerly of the University of Lyons, who had been engaged in research on insect diseases for many years, was chosen to be chief physician to innumerable myriads of small wriggling "patients". He started out in 1924 to work on the task which kept him actively on the job for about three years. In order to come in close contact with the growers and study, first hand, actual conditions in the nurseries, Dr. Paillot had made an automobile specially equipped for laboratory work in the field. Drawers for bacteriological paraphernalia were fitted into the back seat, shelves for holding other supplies were screwed to the sides of the sedan body while a high powered microscope was fastened to a stationary base so that immediate examinations could be made. Glass boxes held caterpillars artificially inoculated for experimental purposes while a microlamp and centrifuge, operating on the battery current of the car, completed the outfit. In this way he could work on fresh specimens before any secondary infections had a chance to set in and obscure the original cause of disease. In the winter the laboratory had a fixed base at Saint-Genis-Laval.

Grasserie, the disease which Dr. Paillot found was making the most serious inroads in the infected regions, has been known since a very early date. The first known record occurs in some Latin verses entitled, "The silkworm of the mulberry tree", by a poet Vida who wrote them in 1527. He described the symptoms recognizably enough and attributed the malady to the evil influence of the winds from the Mediterranean, an idea that still prevails among the peasants of the Midi. In the eighteenth century the disease was well known but its ravages do not appear to have been so severe as those of recent time. Later on in the nineteenth century (*Turn to next page*)

Silk Industry—*Cont'd*

Italian scientists devoted considerable attention to it. In the last twenty-five years entomologists in the principal silk growing countries have made detailed researches with grasserie while in Germany and the United States careful studies have been made on the closely allied diseases that attack pests, such as the nun moth of Europe and the gypsy moth and tent caterpillar of this country.

All these affections belong to a group known as the polyhedral diseases. They attack only members of the moth and butterfly family of insects, and these in the larval and pupal stages only. They are believed to be caused by a filterable virus, the type of causative agent that is so minute that it will slip through a fine porcelain filter. The name arises from myriads of tiny geometrically shaped bodies that can be seen in the blood of diseased insects under the microscope. It was once thought by some that these polyhedra were the cause of the disease, but recent work has shown fairly conclusively that they are only the decomposition products of the action of the virus on the insect's body.

In Germany where there have been one or two very striking epidemics among nun moth caterpillars, the disease is known as "Wipfelkrankheit" from the fact that all the sick caterpillars crawl up to the tops (German, Wipfel) of the trees, hang there by their last pair of legs and die in large numbers. In this country it is simply known as wilt. The affected caterpillars lose their appetite, take no food and subsequently die. Grasserie takes its name from the "gras vers" (fat worms) that are slightly swollen and covered with yellowish splotches. They likewise refuse food and die in large numbers.

Though these diseases are very like it has been proved that they are separate and distinct, since it has not been found possible to infect caterpillars with the virus from diseased caterpillars of another species.

Caterpillars can be inoculated with the diseases by feeding them with the infected virus or leaves which have been stained with the blood of infected insects. Dr. Paillot discovered that he could inoculate worms with the blood of insects infected two days previously and in which no polyhedra could be detected at the time. As the result of many experiments and observations he came to regard the disease to be due to ultramicroscopic intracellular (*Turn to next page*)

Saving the French Silk Industry—*Continued*

FROM SILK COCOONS like these come silk stockings and shirts

organisms which destroy the nuclei of certain cells. The parasites were invisible by ordinary light but under the ultra-microscope they could be seen as minute animated granules of less than one two-hundred-fiftieth of an inch in diameter. They could be strained out of the infective virus by very fine-pored porcelain filters and this filtrate was found not to be infectious. This, he concluded, was good evidence that the minute granules were the cause of the infection. He gave these infinitesimal particles, so much smaller than ordinary germs, the new name Borrellina in honor of his friend, Professor Borrel of the Pasteur Institute.

Though it is stated of the polyhedral diseases that they confine themselves to the caterpillar and pupae of moths and butterflies, Dr. Paillot believes that he has seen the causative organisms under the ultramicroscope in adult silkworm moths. If it is true that the moths carry the disease and transmit it to the eggs, it would be comparatively easy to stamp out the disease just as Pasteur eradicated pébrine. A moth was allowed to lay her eggs on a square of cloth and then was killed and her body examined microscopically. If the germs of pébrine were present, both moth and the square of cloth containing the eggs were burned. Unfortunately the causative organism of grasserie is so minute that its demonstration under even ultramicroscopes is exceedingly difficult and is not at all practicable in the present state of scientific knowledge of the problem.

Though this phase of his work has not been entirely substantiated by other workers, Dr. Paillot believes that the disease is transmitted by moths to their eggs and that the different caterpillars hatched therefrom have various degrees of resistance to the malady which may be broken down by exterior predisposing conditions. Therefore his plan of eradication is a rigid inspection of breeding stock. In France this is no longer in the hands of independent growers but is controlled by specialists in the employ of the French government. In this way it is possible to give out eggs to the growers that come only from known parentage. If any of the stock at any stage of development shows signs of grasserie, they are immediately destroyed and the racks in the nurseries that they have occupied disinfected.

Heat and humidity and insufficient food were found to be important predisposing causes for the development of the disease. For this reason Dr. Paillot recommends that the temperature of the nurseries be kept constantly in the neighborhood of 65 degrees Fahrenheit.

At all times the nurseries should be kept scrupulously clean and periodic disinfections made. Infected worms should be burned, but the best course, he points out emphatically, is prevention by cleanliness, disinfection, and carefully controlled stock.

The problem of flecherie, on which Pasteur worked for a time, was also taken up by Dr. Paillot. This work was left in a rather incomplete state by the great bacteriologist and Paillot took up the trail where his famous predecessor left off. As the result of his investigations, he declares that flecherie is not the single morbid entity that it was formerly believed to be but is a whole group of maladies that affect the intestinal tract. All are characterized by symptoms of dysentery. Of the most practical importance among the microbic dysenteries is the one which has for its cause a germ that Pasteur observed under the microscope and called descriptively "a ferment of a string of beads", now identified as the germ *Streptococcus bombycis*. When this streptococcus infection is complicated with a secondary infection, as it frequently is, the resultant symptoms are those of true flecherie, or the flecherie of Pasteur.

Complicated as the problem is of stamping out diseases among the busy little spinners of the world's most highly prized fabric, putting the process in reverse on this side of the Atlantic to wipe out similarly affected pests is still harder.

No one who has seen extensive epidemics of wilt or Wipfelkrankheit can fail to be impressed, said one American entomologist recently, with the tremendous value of these diseases. They can accomplish a greater reduction of pests than do the combined efforts of all artificially introduced parasites, human spraying and other control measures. Yet man has been able to do very little as yet in the way of their artificial propagation in the places where they are most needed. Trees have been sprayed with emulsified caterpillar corpses but later in the season wilt took just as great a toll in another untreated lot of the same size which was miles away from the first. Quantitative experiments among high trees and underbrush subject to heat, cold and rain are more difficult to perform than experiments under laboratory control. Some sort of human endeavor, however, combined with the natural efficiency of the polyhedral diseases does hold out the hope, some entomologists believe, that they may possibly be utilized here advantageously in the future.

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SILKWORMS, pupae, cocoons, adult moths and eggs—the whole silkworm family

Breeding Increases Wool Clip

Animal Husbandry

Gland grafts for speeding up the growth of sheep and increasing the wool weight, advocated by Dr. Serge Voronoff, famous gland graft surgeon, have not yet been resorted to in this country, inquiry reveals. American sheep growers find that careful breeding alone increases enormously the value of their sheep and also the wool weight. No gland transplantation experiments are being made in this country, so far as is known.

The possible economic value of Dr. Voronoff's work is considered important in European countries, but in the opinion of U. S. Department of Agriculture officials, the cost of performing the delicate surgical operation, even if successful, would greatly offset any gain from possible increase in wool weight and sheep value. However, these officials are still not entirely convinced of the success of Dr. Voronoff's experiments.

In this country breeding has been found to double the wool clip in one generation. An increase of almost 100 per cent. in wool weight was reported by one grower, as a result of breeding. The weight per fleece on his 10,000 sheep was increased from 6 pounds to 11½ pounds. With such results obtained by proved methods which are comparatively easy for the individual grower to use, there appears to be no need for attempting the gland grafts advocated by Dr. Serge Voronoff, Department of Agriculture officials commented.

Dr. Voronoff claims that by implanting the male gland of a fully developed ram in an immature ram, the development of the latter, including the wool growth may be greatly hastened.

Dr. Voronoff has been experimenting with several thousand sheep belonging to the Governor-General of Algeria. However, scientists are not agreed on the success of his experiments. A commission sent by the British Ministry of Agriculture and the Board of Agriculture for Scotland to investigate the work reported that the conditions under which the experiments had been conducted, the inadequacy of the data submitted and the method of presentation of these data made the forming of a critical opinion quite impossible.

According to a recent announcement, Dr. Voronoff has been repeating his experiments and believes now that he has met these objections. He expects to give a successful demonstration of the work in the near future.

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Radio Check on Bird

Ornithology

The age-old problem of where birds go in winter may be solved by the assistance of radio.

Prof. Johannes Thienemann at a bird station at Rossitten, East Prussia, was able, by means of requests for information via microphone, to get valuable check-ups on the movements of a group of storks after number bands had been attached to their legs at the beginning of the fall migratory season last year.

Band numbers sent in by interested members of his radio audience showed that five days after the storks' release on September 26, they were in the Carpathian mountains of Czecho-Slovakia. By October 10 they were near Messini in the southwest of Greece, having flown approximately 1,250 miles in two weeks almost due south. This checks previous experiments with stork migrations made in Germany, but the use of the radio naturally speeds up considerably the process of gathering the required information.

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$4,000 for Bark of Tree

Forestry

The highest-priced bark in the world is the distinction claimed for a variety of cinnamon tree that grows in the province of Thanh Hoa, French Indo-China. The tree reaches a height of thirty or thirty-five feet, and bears a white-spotted bark.

When the tree is stripped, the bark is divided into three parts. That from the upper portion of the trunk is esteemed most highly, and that from the base the least. The king claims two-thirds of the bark from the upper two-thirds of the tree as his own; the rest is auctioned off. The bark of a single tree brings as much as 100,000 francs, which even at post-war exchange rates means $4,000.

The Chinese and Annamese native doctors supply an avid market for this bark; in their mysterious pharmacopeia it is regarded as a cure-all.

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Clouds are sometimes ten miles thick.

New Hormone Source

Endocrinology

A readily available source of the female sex hormone has been discovered by Dr. Siegfried Loewe of Dorpat, Esthonia, formerly of the University of Gottingen, Dr. S. Ascheim of Berlin and Dr. Bernhard Zondek of Friedrich Wilhelm University.

Animal extracts of this hormone have been found to be of considerable value in treating certain disorders in women and girls but there has been difficulty in obtaining them in sufficient quantity. The presence of the hormone in rather large proportions in the secretions of expectant mothers, brought to light by the German scientists, opens up new possibilities in studying this new factor in medicine.

Several of the leading German chemical firms are said to be endeavoring to obtain connection with women's hospitals to secure a source of supply of the hormone to be developed on a commercial scale.

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Students Explain Happiness

Psychology

What sort of young person is happy?

A psychologist at Teachers College, Columbia University wanted to know, so he asked four hundred students to tell whether they considered themselves happy or miserable, rating themselves on a scale of six degrees of happinees and unhappiness. Then he asked them to give a number of facts about themselves.

Reporting the result of his search for the building stones of happiness, Prof. Goodwin Watson told the International Congress of Psychology that the happy student is likely to be a man. He is likely to be above average in health; active in the life of the college; to believe himself able creditably to tell jokes, lead a discussion, act in a play, give a talk on sex, or administer a group of workers; to have a hamonious home; to enjoy his job; to like adventure.

Intelligence appears to have nothing to do with happiness. Nor is much importance to be attached to race, physical disability, size of one's home town, financial, social or educational status of family, nor to personal estimates of ability at sports or at the various arts.

Science News-Letter, September 21, 1929

There are deposits of coal in the Antarctic regions.

Young Psychologists Organize

Psychology

A new institution with some novel features has been established for the study of fundamental problems of psychology by experimental methods. It has been incorporated under the name of the National Institute of Psychology with a widely worded charter authorizing it to conduct research in psychology and "to promote the application of scientific facts and principles to problems of human and animal life and welfare." The management of the Institute is placed permanently in the hands of 50 of the younger experimental psychologists. Each person chosen for active membership must have proved his ability to do original research by himself. Merely teaching psychology or directing the work of others does not make a man eligible. When an active member reaches the age of sixty he is automatically retired to honorary membership. It is hoped that funds may be raised for psychological research and for the purchase of a spacious site in the environs of the national capital where laboratories can be built free from the noise, vibration and electrical disturbances of the city.

The object of the National Institute of Psychology as stated at the Carlisle Conference on Experimental Psychology, March 30, 1928, by Dr. Knight Dunlap, the chairman of the Conference, is to found "a national psychological laboratory, similar in some of its functions to the Bureau of Standards, but not under Federal control. Such a laboratory can be under a relatively permanent director and can undertake programs of research too lengthy, too expensive, and too complicated for other institutions. In such a laboratory, truly cooperative results of the highest value can be obtained. Men working in other laboratories on details of the problems undertaken in the national laboratory could make arrangements to transfer their work there during a year's leave of absence, or in summers. Work done here can be subjected to criticism while in progress, instead of afterwards, and the cooperative method can insure greater certainty as to conditions. Such a national laboratory will be of really inestimable advantage to psychology, not only because of its availability for the solution of problems unwieldy elsewhere, but because through it better standards of research may be elevated.

"The day of the isolated experimenter and of fragmentary problems is passing. Unless we find means of shaping our problems into coherent plans of larger unity, unless we find means of carrying out vital research and postponing the merely interesting, unless we can pool our constructive and critical abilities, we shall be out of step with the advance of scientific method."

The National Institute of Psychology was incorporated in the District of Columbia by Prof. Knight Dunlap of Johns Hopkins; Hugh S. Cumming, Surgeon-General, United States Public Health Service, and Edwin E. Slosson, director of Science Service.

The National Institute of Psychology as organized consists of the following active members: John E. Anderson, Minnesota; Madison Bentley, Cornell; E. G. Boring, Harvard; Warner Brown, California; Harvey A. Carr, Chicago; Percy W. Cobb, Cleveland; J. E. Coover, Stanford; K. M. Dallenbach, Cornell; J. F. Dashiell, North Carolina; F. C. Dockeray, Ohio Wesleyan; Raymond Dodge, Yale; Knight Dunlap, Johns Hopkins; Franklin Fearing, Northwestern; S. W. Fernberger, Pennsylvania; Frank Freeman, Chicago; H. L. Hollingworth, Columbia; Clark Hull, Wisconsin; H. M. Johnson, Mellon Institute; K. S. Lashley, Institute for Juvenile Research, Chicago; Walter Miles, Stanford; H. S. Langfeld, Princeton; Joseph Peterson, Nashville; Rudolf Pintner, Columbia; A. T. Poffenberger, Columbia; E. S. Robinson, Yale; Calvin P. Stone, Stanford; Margaret F. Washburn, Vassar; A. P. Weiss, Ohio State; Frederick L. Wells, Boston Psychopathic Hospital; Herbert Woodrow, Oklahoma; R. S. Woodworth, Columbia; Robert Yerkes, Yale.

The following were made honorary members of the National Institute of Psychology: W. D. Scott, Northwestern; G. M. Stratton, California; C. E. Seashore, Iowa; L. Witmer, Pennsylvania; Eleanor A. Gamble, Wellesley.

Science News-Letter, September 21, 1929

Touch New Aid to Lip Reading

Psychology

Deaf persons, who carefully watch the lips of those who engage them in conversation, may be aided by a new sense if experiments now in progress prove applicable to everyday life.

Dr. Robert H. Gault, professor of psychology at Northwestern University, has found that when deaf individuals watch the lips of a speaker, and at the same time hold in their hands apparatus which conveys the sounds to their fingers in the form of vibrations, they are better able to undestand what is said than when they depend on lip reading alone. The equipment which enables the deaf to receive forms of speech through their fingers or the palm of the hand is known as a teletactor, and consists of a microphone, an amplifier, batteries, and a receiver. This equipment in Dr. Gault's first experiments was large and heavy, but it has now been reduced in size to a conveniently portable instrument, so that it is more serviceable for practical purposes.

Touch is a greater aid than vision in enabling the deaf to detect accent in speech, the experiments indicate. From the vibrations a deaf person can more readily distinguish, for example, between such words as "cover" and "convert" by the added clue of the accent which he "feels". Thus the sense of touch appears to give back to the deafened a clue to speech interpretation which is one of the valuable aids that normally hearing people depend on.

As further experiments are in progress, Dr. Gault states, he is not yet ready to announce his conclusions as to the extent to which the teletactor may prove serviceable in the everyday experiences of the hard of hearing.

Science News-Letter, September 21, 1929

Musk oxen and reindeer can live in the same areas without interfering with each other's food supply, because the food eaten by one is avoided by the other.

Remembering By Forgetting

Psychology

If you sometimes forget the names of persons and places, you are invited by Prof. Knight Dunlap of Johns Hopkins University to join with him in testing a new psychological theory of habit formation that he explained.

If you wish to remember, try hard to forget. That is Dr. Dunlap's method, paradoxical and contrary to previous psychological theories as it may sound. So when next you rediscover the name of the person you can not remember, make up your mind that you do not wish to remember and put in a few seconds of good hard forgetting. You may be surprised, as Dr. Dunlap was, to find that the next time you see the person you have remembered his name.

Dr. Dunlap's theory of habit formation and its application to the breaking of undesirable habits was first enunciated nearly two years ago. It is almost the reverse of the theory William James formulated and which scientists have ever since held to be practically axiomatic: that doing something over and over again fixed the habit more firmly.

The method for habit breaking recommended by Dr. Dunlap is to deliberately do what you are trying to stop. Repetition under the proper conditions has been found to break the habit. Dr. Dunlap told the psychologists that his present researches are "either the most foolish or the most significant line of activity in which I have engaged."

Thumb sucking in four and five-year-old children has been greatly reduced by having the child suck his thumb for a short period each day with mother or nurse explaining to him that that is the time to suck his thumb and that this performance will help him stop the habit at other times.

Stammering is another habit to which Dr. Dunlap has begun to apply his new method but in this habit as in many others cure or decisive improvement can not be expected in less than a year. Another investigator following Dr. Dunlap's methods achieved remarkable success in breaking a group of college students of fingernail biting. Errors in typewriting and musical renditions have also been attacked by the new method.

Dr. Dunlap made the discovery of the application of his habit theory to memory of names while he was riding past a small Maryland town which he habitually forgot. He tried to forget it and since then he has always remembered. Since this first success, Dr. Dunlap said, "I have been having a good time demolishing my specific amnesias as fast as they present themselves."

Science News-Letter, September 21, 1929

Children Slow to Sleep

Physiology

Believe it or not, children take, on the average, twenty minutes to go to sleep. This is the finding of the mothers of one thousand children under eight years of age. The mothers have kept records in co-operation with Dr. Josephine C. Foster of the Institute of Child Welfare at the University of Minnesota.

Children less than six months old sleep about fifteen hours a day. Children seven years old sleep practically eleven hours. Averaging the records of children of all ages and records of all seasons of the year, the time required for dropping off to sleep was twenty minutes.

Late hours, popularly associated with city life, do not affect city youngsters, the records indicate. Country children went to bed later and rose earlier than the city children.

Science News-Letter, September 21, 1929

Backhand Writing Inborn

Psychology

The child who persists in pushing his pen backhand style in spite of school fashions in penmanship is really seeking to attain a harmony of movement in accordance with his own physical traits. Even though he may not be recognized as a left-handed individual, his desire to slant his writing backward is an indication of some left-handed or left-eyed trait, according to Dr. June Downey, of the University of Wyoming.

Dr. Downey has studied forty-five supposedly right-handed individuals who slant their writing back. Some of these, she found, had been left-handed children who were taught to use the right hand. Some were ambidextral. Fully sixty per cent. of the group either had the left eye dominant, or else the two eyes were impartially depended upon.

Science News-Letter, September 21, 1929

Hardest Compound

Chemistry

Tungsten carbide, the hardest compound known to science, and for years a mere curiosity, has now begun to find extensive commercial use. With it, hard alloys, such as manganese steel and armor plate, can be machined in lathes, planers and shapers, says Dr. Samuel L. Hoyt, of the General Electric Co., in a report to the Engineering Foundation, soon to be published as a Research Narrative.

One of the constituents of this remarkable substance is tungsten, the familiar metal of which the filaments of our electric lamps are made. Though years of research resulted in a process of making tungsten so that it could be drawn into fine wires, when combined with carbon, it makes a substance second in hardness only to the diamond. Tungsten carbide will scratch a sapphire, which is the second hardest natural mineral.

At first, despite its hardness, tungsten carbide was too porous to stand the strain imposed upon a cutting tool. But researches of Dr. Hoyt and his associates have shown how these difficulties can be overcome. In this form it is known commercially as "carboloy".

"In testing high-speed steel tools," said Dr. Hoyt, "it is customary to use a 'test log', i. e., a long, round bar of nickel-steel, making a cut in it at about 50 feet per minute. Because of the lack of effect on the carboloy cutter, however, it was necessary to increase the speed to 200 feet per minute. At this speed a high-speed steel cutter failed in 16 seconds, with its edge burned off. The tungsten carbide tool, under identical conditions, was run for an hour before the test was arbitrarily stopped, although the tool was still cutting and capable of continuing for a much long time.

"Consequently, the carbide tool in many operations effects substantial savings of time and costly labor. In others it gets much better results. With it numerous operations are feasible which are not possible with any other known tool material. Nevertheless, the alloys of tungsten carbide have limitations. They will break down, for example, in work involving very heavy pressures on the tools. Carboloy is as yet on the market only to a limited extent although it has been in practical use for the past three years. A great advance in the art of cutting metals appears to be in immediate prospect."

Science News-Letter, September 21, 1929

Nature Ramblings

Natural History

By Frank Thone

Leucothoe

It might strike one as a trifle odd to find here in modern America a memorial to a princess of Babylon, and a mythical princess at that. Yet such is the case. For growing in the mountains, from Virginia southward, there are three species of a shrub that have been named Leucothoe, for the daughter of a king of Babylon mentioned in the works of the Latin poet Ovid. The man who named the genus must have had much more of a taste for the classics than most modern botanists have. A fourth species, summing up the genus so far as eastern America is concerned, grows at lower altitudes along the coast from Massachusetts to Florida.

The shrub is really a most graceful and attractive-appearing plant, with long, slender, arching branches that bend over and touch the ground with their tips, forming very much intertangled thickets. It is next to impossible to wade through a dense growth of Leucothoe, for the tough stems catch and hold you by the ankles. For this it has received the name "fetter-bush".

Curiously enough, however, there is at least one rural region where the plant is not known by its homely and descriptive English name, but by its classical and more or less fanciful Greek one. In the Great Smoky Mountains of Tennessee, now designated as a National Park, the inhabitants call it Leucothoe just as the botanists do, or sometimes "Leucotia," obviously only a slight corruption of the name. Presumably they had no well-agreed-on English name, and adopted the technical one from botanists who have long made a Mecca of their mountains.

Science News-Letter, August 10, 1929

Several species of cactus were taken from America to the Old World by early European explorers and became established in the Mediterranean region.

Would Have Zoos Study Apes

Zoology

A plea to the zoos of the world to help enhance man's knowledge of his nearest relatives by utilizing captive specimens of the higher apes for biological study, has been made by Prof. Robert M. Yerkes, renowned psychologist of Yale, and Ada W. Yerkes in a huge scientific work entitled "The Great Apes."

"For decades," declared Prof. Yerkes, "the zoological gardens of the world have held captive specimens of gibbon, siamang, orang-outan, chimpanzee and gorilla. Often the individuals have lived for many years, and occasionally they have bred, in reasonably satisfactory environment. Yet, almost without exception, the scientific use of these exhibition specimens has been neglected. Evidently there is opportunity for some progressive zoological-garden director to lead the way and establish a fashion by converting his establishment into a center for biological research without undesirably sacrificing its primary function of entertainment and education."

Detailed study and observation of the man-like apes is absolutely necessary, according to Prof. Yerkes, to make any generalizations about the psychological make-up of the nearest kin to the human race. Thus far only isolated examples have been available for prolonged study of the orang-outan, chimpanzee and gorilla, so that it is impossible to draw any very general conclusions with respect to their relative intelligence.

Yale has one of the very few special laboratories for anthropoid research. Eventually Prof. Yerkes hopes that there will be available a breeding station for apes somewhere in the subtropics where studies can be made on reproduction and life history and young apes can be reared for investigation of special subjects.

Probably the most notable among projects of this sort in existence today is a station maintained by the Pasteur Institute at Kindia in French Guinea, Africa. Here scores of chimpanzees and other primates are kept in as close an approximation of their natural environment as possible. They are now used largely in medical studies but plans are under way to add equipment whereby it will be possible to start psychological and biological investigations at an early date.

Science News-Letter, September 21, 1929

Preventing Crimes of Insane

Criminology

The individual who suddenly takes an uncontrollable impulse to destroy life or property, one of the great unsolved problems of society, was brought before the attention of psychologists at the International Congress of Psychology.

Prof. Fred. A. Moss, of George Washington University, stressed the importance of insanity as a cause of preventable crime.

"Insanity is more and more frequently being offered as a defense in criminal procedure," he said. "Some of the more obvious types of insanity, such as those accompanied by wild excitement or marked hallucinations, are fairly easily recognized. But there are certain types of mental disorders, that often lead to the most serious crimes, which are not recognized, or if they are recognized, their predisposing influence to crime is overlooked."

Citing mental maladies that may lead to such unexpected outbreaks, Prof. Moss mentioned epilepsy, dementia praecox, senile dementia, paranoia, paresis, and impulsive obsessions.

The victim of paranoia may reason logically and conduct most of his affairs with good judgment and yet may believe himself to be persecuted by some wholly innocent person or organization. Such an individual hesitates at nothing that would further his revenge on those who, he imagines, are persecuting him, the psychologist explained. Dementia praecox, a mental disease of youth, often causes the patient to hear imaginary voices inciting him to acts of violence. In the degeneration of old age, anatomical changes are sometimes accompanied by senile dementia and serious crimes may be inspired.

There is a need for more effective recognition of persons who are potentially dangerous because of mental and nervous disorders, and there is need for more effective handling of their cases when such persons are brought into custody for committing crimes, Prof. Moss urged.

Science News-Letter, September 21, 1929

FIRST GLANCES AT NEW BOOKS

GENERAL COLLEGE CHEMISTRY—Joseph A. Babor—*Crowell* ($3.75). Most school textbooks stick close to the beaten track and it is hard to distinguish a new one from any of the old ones. But here is a chemistry that is different. Instead of fending off the student from any acquaintance of atoms and electrons until these have been duly introduced in the logical or chronological development of the subject, Prof. Babor has adopted the reverse tactics of attack. He starts in boldly with the most modernistic theories of the structure of the atom, electron shells, octet-orbits, covalence, non-polar bonds, which gives him the advantage of using these conceptions in the interpretation of phenomena all the way through the descriptive part.

Chemistry
Science News-Letter, September 21, 1929

LABORATORY MANUAL IN GENERAL COLLEGE CHEMISTRY—Joseph A. Babor and Alexander Lehrman—*Crowell* ($2). A laboratory manual to accompany Dr. Babor's "General College Chemistry", reviewed above. The experiments are gauged from simple to difficult, and as there is much more material than can be covered in a single year, the instructor has a wide choice before him.

Chemistry
Science News-Letter, September 21, 1929

BEGINNING CHEMISTRY — Fletcher, Smith and Harrow—*American Book Company* ($1.60). A clear, concise and interesting elementary textbook; well illustrated with neat drawings and provided with references to supplementary reading and questions devised to stimulate thinking. The author has wisely included much practical chemistry on such topics as paints, foods, and nutrition.

Chemistry
Science News-Letter, September 21, 1929

TELEVISION—H. Horton Sheldon and Edgar Norman Grisewood—*Van Nostrand* ($2.75). In preparing this first American book on television, the authors have gathered material on the chief British and American methods, including Baird, Ives, Alexanderson, Jenkins and Goldsmith, all of which is incorporated in its pages. Thus it tells of the present crude methods which foreshadow the perfection that will undoubtedly come in the next few years.

Television
Science News-Letter, September 21, 1929

SOME NOTES ON BOOKBINDING—Douglas Cockerell—*Oxford* ($2.50). Whoever is interested in books (and that probably includes every reader of the NEWS-LETTER) will be interested in this little account of their bindings. Mr. Cockerell speaks from a background of long practical experience and tells how books are bound and what to look for in a good binding. Incidentally, the book itself is a splendid example of the best work of the art of which he writes.

Library Science
Science News-Letter, September 21, 1929

WORLD HISTORY TODAY—Albert E. McKinley, Arthur C. Howland, and Matthew L. Dann—*American Book Company* ($1.92). World histories written with a regard for the part that science and industry have played in world progress are typical products of this generation. This history is intended for class use.

History
Science News-Letter, September 21, 1929

SHABIK'ESHCHEE VILLAGE—Frank H. H. Roberts, Jr.—*Smithsonian Institution* ($1). An important contribution to the knowledge of the prehistoric Basket Maker Indians, who inhabited the Southwest before the coming of the Pueblos. The village excavated by Mr. Roberts, in the Chaco Canyon, New Mexico, showed definitely the type of houses in which the Basket Makers lived. Evidence also was found indicating that the transition between the Basket Maker and Pueblo culture was an orderly one, with no sharp break.

Archæology
Science News-Letter, September 21, 1929

RACE AND POPULATION PROBLEMS—H. G. Duncan—*Longmans, Green & Co.* ($2.50). Everyone with an eye to history or posterity will be interested in this comprehensive volume on all aspects of the population problem.

Sociology
Science News-Letter, September 21, 1929

HOW ANIMALS FIND THEIR WAY ABOUT—Etienne Rabaud — *Harcourt, Brace* ($2.75). A translation of an account originally published in French, of critical experiments and observations on the vexed and much-discussed questions of the direction sense and homing instincts of animals.

Comparative Psychology
Science News-Letter, September 21, 1929

PRINCIPLES OF PLANT PHYSIOLOGY—Oran Raber—*Macmillan* ($3). A few years ago teaching plant physiologists complained, justifiably, that there was a great dearth of text books in their field which might be offered to beginning graduates or to upperclass undergraduates. This situation is now in a fair way toward being remedied, and Dr. Raber's book is not the least among the contributions toward this happy end.

Plant Physiology
Science News-Letter, September 21, 1929

COTTON AND OTHER USEFUL FIBERS—Nellie B. Allen—*Ginn* (80c.). An inexpensive but really attractively gotten-up and illustrated book giving a condensed and up-to-date account of several of the principal textiles.

Textiles
Science News-Letter, September 21, 1929

BIRDS OF NEW MEXICO—Florence Merriam Bailey—*New Mexico Dept. of Game and Fish* ($5). A complete and thorough-going account of the birds of one of our most interesting faunal regions, supplying a long-felt lack. The author makes a most happy combination of scholarliness and readability; and the color plates by Allan Brooks and the monochrome pictures by the late Louis Agassiz Fuertes add greatly to the value of the book. It is a volume that every ornithologist will want to add to his library.

Ornithology
Science News-Letter, September 21, 1929

THINGS ANY BOY CAN MAKE—Joseph Leeming—*Century* ($2). This book contains instructions and diagrams for making 101 simple and amusing articles or toys. It is designed especially for younger boys, for none of the things described requires unusual skill, and the tools called for are of the simplest—scissors, knife, paper, cardboard, elastic bands and other implements always on hand in the home.

General Science
Science News-Letter, September 21, 1929

WORKING WITH ELECTRICITY—Katherine L. Keelor — *Macmillan* ($1.75). Simple electrical experiments, told in easy language for children in the third and fourth grades. With the aid of this book, they can make bells, buzzers and telegraph instruments.

Electricity
Science News-Letter, September 21, 1929

Man and His World

General Science

MAN AND HIS WORLD—Northwestern University Essays in Contemporary Thought, Edited by Baker Brownell — Van Nostrand (12 volumes $19.25). Northwestern University is utilizing all the modern means of approach in the extension of its educational work. Prof. Baker Brownell's course in Contemporary Thought is given first in the classroom of the school of journalism from which it is broadcast to a wide circle of listeners who study the lectures and pursue the reading. The lessons are also carried in the *Chicago Daily News* and now they have been brought together in twelve handy little volumes in covers so gay and decorative as to entice the unwary reader into thinking that they were a set of new detective stories or novels. Here are gathered a few of the fifty-eight contributors of the varied beliefs presenting a composite picture of modern views of the universe and the problems of modern life. The scope of the work is best shown by the mention of some of the lectures or subjects which they discuss. Ellsworth Huntington, "Does Civilization Set Us Free?"; Zona Gale, "Modern Prose"; Walter Dill Scott, "The New Energies and the New Man"; W. E. Hotchkiss, "Business in the New Era"; Fay-Cooper Cole, "Primitive Societies"; Joseph Jastrow, "Mind and Emotional Control"; Robert Morss Lovett, "The Value of Living"; Shailer Mathews, "The Religious Life"; Bishop Francis J. McConnell, "Fact and Faith"; Austin H. Clark, "Animal Evolution"; Morris Fishbein, "Society and the Human Body"; Richard T. Ely, "The Practical Approach to the World"; Clark Wissler, "The Origin of Man and His Races"; Ferdinand Schevill, "Man's Political History"; Whiting Williams, "What's Machinery Doing To Us?"; Charlotte Perkins Gilman, "Feminism and Social Progress"; Baker Brownell, "The New Universe"; Edwin E. Slosson, "The Democracy of Knowledge" and "The Energy of the New World."

The course in Contemporary Thought, which is the origin of these essays on "Man and His World," is one of the efforts made by various universities in different ways to give the student a synthetic survey of modern civilization to counteract, so far as possible, the extreme specialization of most university courses. The editor has not attempted to bring these various thinkers into conformity. This would be practically impossible as well as undesirable. But the student and the independent reader will gather from this collection a more realistic conception of present day problems and the world in which he must live and work than he is likely to get from miscellaneous reading.

Science News-Letter, September 21, 1929

Books—*Cont'd*

THE AVIFAUNA OF EMERYVILLE SHELLMOUND—Hildegard Howard—*Univ. of Calif. Publ. in Zool.* ($1.25). An exhaustive examination of the bird bones of one of California's famous Indian refuse heaps. That the aborigines were not too nice in their tastes is attested by the presence of bones of buzzards, hawks and owls as well as those of the more appealing waterfowl.

Zoology

Science News-Letter, September 21, 1929

OUTLINES OF GENERAL ZOOLOGY—H. H. Newman—*Macmillan* ($3.50). A revised edition of Prof. Newman's excellent textbook.

Zoology

Science News-Letter, September 21, 1929

SKYLARKING—Bruce Gould—*Horace Liveright* ($2.50). Not the history of aviation, not the story of an individual exploit, but the intimate details of the romantic adventure of flying.

Aviation

Science News-Letter, September 21, 1929

FORTUNA: OR CHANCE AND DESIGN—Norwood Young—*Dutton* ($1). A new book in the Today and Tomorrow series. The author makes a statistical analysis of several methods by which "suckers" can lose money, and concludes that the least rapid is trente-et-quarante, and the fastest the stock exchange.

Statistics

Science News-Letter, September 21, 1929

ALPHABET OF IDEAS OR DICTIONARY OF RO—Edward Powell Foster—*Roia* ($1). A convenient dictionary of the universal language Ro.

Language

Science News-Letter, September 21, 1929

Musical Will-o'-the-Wisp

Physiography

The mysterious acoustic phenomenon over Yellowstone and Shoshone Lakes, recorded rarely but nevertheless intermittently during the past 44 years, has again been heard this summer on two succeeding days. The descriptions of the weird sounds vary. To some they are "musical". Others describe them as resembling the whirring sound made by the wings of many birds flying through the air, and to yet another they resemble moans.

Among the latest to hear the mysterious noises are Harold P. Fabian, Republican national committeeman from the State of Utah, and Edward E. Ogston, assistant chief ranger of Yellowstone. While fishing on Grebe Lake, with the breeze blowing in a northerly direction, they heard sounds similar to that coming from an airplane, originating in the east, passing over the lake, and dying in the west. The following day Chief Ranger George Baggley, while standing within 200 yards of the shore of Lake Yellowstone, heard the sounds, similar to that of many birds in flight, occur at three different times.

Back in 1885 John H. Renshawe, topographic engineer of the United States Geological Survey, recorded hearing the mysterious sounds when he had a supply camp on the west shore of the Lake about half-way between the present location of the Lake Hotel and the Lake Outlet. Mr. Renshawe states that he frequently heard the sound which has been called music, but that to him it was something more like a moan. This sound, he says, seemed to come from a hot spring on the bank of the lake on the opposite shore, and was dependent upon the state of the atmosphere and the direction of the wind. On approaching the spring, however, the only sound heard was the hiss of escaping steam.

While he was crossing the lake in a home-made boat with three assistants one morning, a strong wind came up and the boat was struck by lightning. One member of the party was killed, while the others were knocked unconscious. Mr. Renshawe states that the bolt of lightning which struck the boat came apparently out of a clear sky, and that when he regained consciousness the sun was shining and the air was clear. It is believed by some that the bolt of lightning from the clear sky may in some way be closely allied to the cause of the acoustic phenomenon.

Science News-Letter, September 21, 1929

CLASSICS OF SCIENCE: Muybridge on Attitudes of Animals

Moving Pictures

Among the many interesting devices for the study of motion, which may be considered ancestral forms of the modern movie, the simple plan of taking one picture after another at short intervals with a battery of cameras can scarcely lay claim, perhaps, to close kinship with the present-day compact apparatus. But the attitudes of animals, which Muybridge set out to show, were revealed by this method, to the great satisfaction of its inventor and his patron, Leland Stanford, and to the delight of large audiences who responded, to quote a contemporary, with "plaudit after plaudit."

THE ATTITUDES OF ANIMALS IN MOTION

By Eadweard Muybridge, of San Francisco

(A lecture delivered before the Franklin Institute, February 13th, 1883.)

Journal of the Franklin Institute, April, 1883.

The problem of animal mechanism has engaged the attention of mankind during the entire period of the world's history. Job describes the action of the horse; Homer, that of the ox; it engaged the profound attention of Aristotle, and Borelli devoted a lifetime to its attempted solution. . . .

While the philosopher was exhausting his endeavors to expound the laws that control and the elements that effect the movements associated with animal life, the artist, with a few exceptions, seems to have been content with the observations of his earliest predecessors in design, and to have accepted as authentic without further inquiry, the pictorial and sculptural representations of moving animals bequeathed from the remote ages of tradition.

When the body of an animal is being carried forward with uniform motion, the limbs in their relations to it have alternately a progressive and a retrogressive action, their various portions accelerating in comparative speed and repose as they extend downwards to the feet, which are subject to successive changes from a condition of absolute rest, to a varying increased velocity in comparison with that of the body.

The action of no single limb can be availed of for artistic purposes without a knowledge of the synchronous action of the other limbs; and to the extreme difficulty, almost impossibility, of the mind being capable of appreciating the simultaneous motion of the four limbs of an animal, even in the slower movements, may be attributed the innumerable errors into which investigators by observation have been betrayed. When these synchronous movements and the successive attitudes they occasion are understood, we at once see the simplicity of animal locomotion, in all its various types and alterations. The walk of a quadruped being its slowest progressive movement would seem to be a very simple action, easy of observation and presenting but little difficulty for analysis, yet it has occasioned interminable controversies among the closest and most experienced observers. . . .

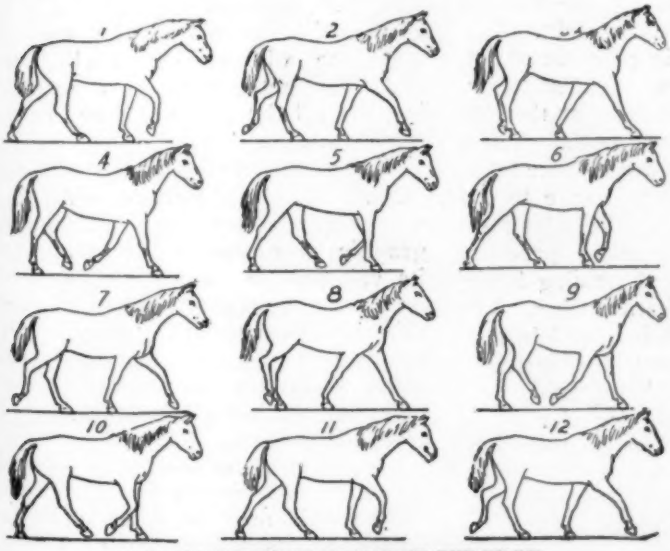
Photography, at first regarded as a curiosity of science, was soon recognized as a most important factor in the search for truth, and its more popular use is now entirely subordinated by its value to the astronomer, the anatomist, the pathologist, and other investigators of the complex problems of nature. The artist, however, still hesitates to avail himself of the resources of what may be at least acknowledged as a handmaiden of art, if not admitted to its most exalted ranks.

Having devoted much attention in California to experiments in instantaneous photography, I, in 1872, at the suggestion of the editor of a San Francisco newspaper, obtained a few photographic impressions of a horse during a fast trot.

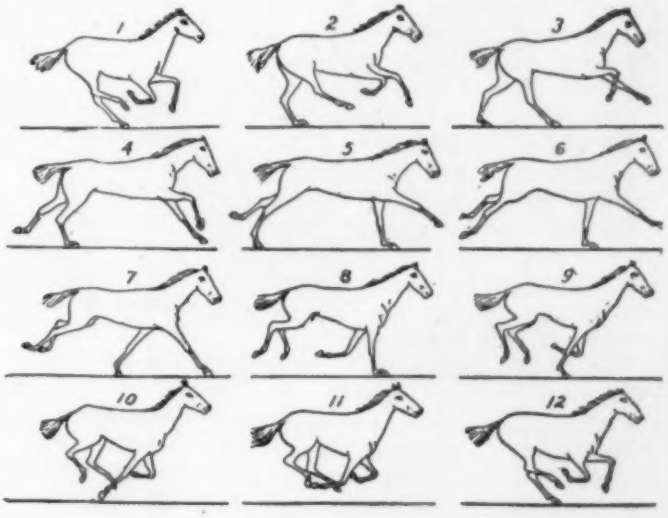
At this time much controversy prevailed among experienced horsemen as to whether all the feet of a horse while trotting were entirely clear of the ground at the same instant of time. A few experiments made in that year proved a fact which should have been self-evident.

Being much interested with the experiments of Professor Marey, in 1877, I invented a method for the employment of a number of photographic cameras, arranged in a line parallel to a track over which the animal would be caused to move, with the object of obtaining, at regulated intervals of time or distance, several consecutive impressions of him during a single complete stride as he passed along in front of the cameras, and so of more completely investigating the successive attitudes of animals while in motion than could be accomplished by the system of M. Marey.

I explained the (*Turn to next page*)



SOME CONSECUTIVE PHASES OF THE WALK.



SOME CONSECUTIVE PHASES OF THE GALLOP.

HOW ANIMALS MOVE, as proved by Muybridge's series of instantaneous photographs

Attitudes of Animals—*Continued*

plan of my intended experiments to a wealthy resident of San Francisco—Mr. Stanford—who liberally agreed to place the resources of his stock-breeding farm at my disposal, and to reimburse the expenses of my investigations, upon condition of my supplying him, for his private use, with a few copies of the contemplated results. . . .

[*The following description of the photographic apparatus is arranged from Muybridge's account of it.—Ed.*]

In the studio are arranged 24 photographing cameras; at a distance of 12 inches from the centre of each lens an electro-exposor is securely fixed in front of each camera. Threads 12 inches apart are stretched across the track at a suitable height to strike the breast of the animal experimented with, one end of the thread being fastened to the background, the other to the spring, which is drawn almost to the point of contact.

This spring actuates the electro-exposer, which is constructed as follows: Two shutters, each comprising two panels, with an opening between them, are adjusted to move freely up and down in a frame; they are arranged ready for an exposure, and are held in position by a latch and trigger, all light being excluded from the lens. A slight extra tension of the thread will cause a contact of the metal springs and complete a circuit of electricity through the wires and the electro magnet; the consequent attraction causes the armature to strike the trigger, the latch is released, the shutters are drawn respectively upwards and downwards by means of the rubber springs, and light is admitted to the sensitised plate while the openings in the shutters are passing each other in front of the lens.

The animal in its progress over the track will strike these threads in succession, and as each pair of strings is brought into contact, the current of electricity thereby created effects a photographic exposure, and each consecutive exposure records the position of the animal at the instant the thread is struck and broken.

For obtaining successive exposures of horses driven in vehicles, one of the wheels is steered in a channel over wires slightly elevated from the ground; the depression of each wire completes an electric circuit, and effects the exposures in the same manner as the threads. . . .

The Walk

Selecting the horse for the purposes of illustration, we find that during his slowest progressive movement—the walk—he has always two, and, for a varying period, three feet on the ground at once. With a fast-walking horse the time of support upon three feet is exceedingly brief; while during a very slow walk all four feet are occasionally on the ground at the same instant.

The successive order of what may be termed foot fallings are these. Commencing with the landing of the left-hind foot, the next to strike the ground will be the left fore foot, followed in order by the right hind and right fore foot. So far as the camera has revealed, these successive foot fallings during the walk are invariable, and are probably common to all quadrupeds. But the time during which each foot, in its relation to the other feet, remains on the ground, varies greatly with different species of animals, and even with the same animal under different conditions. During an ordinary walk, at the instant preceding the striking of the left hind foot, the body is supported on the right laterals, and the left fore foot is in act of passing to the front of the right fore foot. The two hind feet and the right fore foot immediately divide the weight. The right hind foot is now raised, and the left hind with its diagonal fore foot sustains the body; the left fore next touches the ground, and for an instant the animal is again on three feet; the right fore foot is immediately raised and again the support is derived from laterals—the left instead of as before the right. One-half of the stride is now completed, and a similar series of alternations, substituting the right feet for the left, completes the other half. These movements will perhaps be more readily understood by a reference to the longitudinal elevation, which illustrates some approximate relative positions of the feet of a rapid walking horse, with a stride of 5 feet 9 inches. The positions of the feet indicated in this, and also in the other strides illustrated are copied from photographs, and from them we learn that during an ordinary walk the consecutive supporting feet are—

1. The left hind and left fore—*laterals.*
2. Both hind and left fore.
3. Right hind and left fore—*diagonals.*
4. Right hind and both fore.
5. Right hind and right fore—*laterals.*
6. Both hind, and right fore.
7. Left hind and right fore—*diagonals.*
8. Left hind and both fore.

Commencing again with the first position; it is thus seen that when a horse during a walk is on two feet, and the other two feet are suspended between the supporting legs, the suspended feet are laterals. On the other hand, when the suspended feet are severally in advance of and behind the supporting legs, they are diagonals.

These invariable rules seem to be neglected or entirely ignored by many of the most eminent animal painters of modern times.

The Gallop or Run

This movement has in all ages been employed by artists to convey the impression of rapid motion, although curiously enough, the attitude in which the horse has been almost invariably depicted is one which is impracticable during uniform progressive motion. . . .

From this analysis it will be seen, by reference to stride 9, that a horse, during an ordinary gallop, is supported consecutively by:

1. The left hind foot,
2. Both hind feet,
3. The right hind foot,
4. The right hind and left fore feet,
5. The left fore foot,
6. Both fore feet,
7. The right fore foot,

with which he leaves the ground, while the only position in which we find him entirely without support is when all the legs are flexed under his body. . . .

The employment of automatic apparatus for the purpose of obtaining a regulated succession of photographic exposures is too recent for its value to be properly understood, or to be generally used for scientific experiment; at a future time, the pathologist, the anatomist, and other explorers for hidden truths will find it indispensable for their complex investigations.

Science News-Letter, September 21, 1929

The thickness of the ice sheet which covers the center of Greenland is unknown.